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ABSTRACT

A study of a two-way bilingual program in the Port Chester, NY Public Schools examined the relationship between classroom environment, and the language proficiency levels and second language learning outcomes of bilingual and monolingual pupils participating in the program. Pupils were second- through fifth-graders, including native-Spanish-speaking, limited-English-proficient (LEP) pupils, and proficient native-English-speaking pupils. The instructional outcomes investigated include English and Spanish language proficiency, and academic achievement in mathematics. Data sets were collected between 1984 and 1987. The classroom environment was assessed by student perceptions of the degree of satisfaction, friction, competitiveness, difficulty, and cohesiveness in the classroom. Analysis of the data confirms the important role of classroom environment and language proficiency in bilingual and second language learning for elementary school children. For each year of the two-way program, students perceptions of their classroom environment influenced their growth in learning a second language. (MSE)

LINKS BETWEEN BILINGUALISM, ACHIEVEMENT, AND PSYCHOSOCIAL CLASSROOM ENVIRONMENT AMONG BILINGUAL AND MONOLINGUAL STUDENTS

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BACKGROUND

Since 1984, Port Chester Public Schools in New York State has implemented a two-way bilingual program to foster first and second language learning among bilingual and monolingual students. One innovative feature of its curricular design called for joint language learning by Hispanic pupils of limited-English proficiency (LEP) and American youngsters of English proficiency (EP) (Perez, 1984)). Recently Crawford (1989) highlighted the potential of two-way bilingual programs in the United States:

> With immigrants, refugees, and indigenous minorities swelling the U.S. school population, two-way programs are feasible not only in Spanish, but in Japanese, Russian, Arabic, Mandarin, and other world languages. What's more, these linguistic resources are free. All that is needed is the foresight to tap them. Perhaps some day to become Americanized will no longer mean to become bilingual. (p.173)

In addition , investigations by Ellett et al. (1978), Fraser et al.(1982), and Talmage & Walberg (1978) have established the impact of psychosocial class-room environment on learning. However, very little is known at a practical level about the connections between classroom environment, and the language proficiency levels and second language learning outcomes of bilingual and monolingual pupils.

In addition to describing their achievement in both languages (Spanish and English), this paper reports the three year longitudinal results (1984-87) of these students' perceptions of their psychosocial learning environments.

OBJECTIVES

My paper, then, has two main objectives: (1) to identify the linkages between classroom environment and such variables as: language proficiency, second language learning, and years in program; and (2) to report the instructicnal outcomes of bilingual and monolingual pupils who participated in this two-way bilingual program. Three years of data on language proficiency, second language learning outcomes, and classroom environment will be analyzed and interpreted.

PERSPECTIVE

Cummins (1981) and more recently, Hakuta & Gould (1987) maintain that instructional use of the native language of language-minority students will increase their English language development due to the underlying processes in learning to become literate in more than one language (e.g., similar cognitive strategies). The latter authorities also claim that two-way bilingual programs "...may go a long way in encouraging intercultural understanding" (p.44).

In addition to this perspective on the positive benefits between bi-

lingualism, bilingual instruction, and English language development, the viewpoint of Fraser et al. (1982) and other authorities on learning environments will be utilized to identify the specific role of psychosocial classroom environment within this unique language-learning context. In particular, student perceptions about satisfaction, friction, difficulty, competetiveness, and cohesiveness will be examined for their theoretical and practical importance in gauging the classroom environment of two-way bilingual programs.

METHODS

The longitudinal design combines descriptive and analytical elements. From 1984 to 1987, 35 LEP pupils spanning various grade levels in a self-contained class (2-5) and 19 EP pupils (who began the program in the 2nd grade) received instruction in their native and second languages, respectively. LEP pupils were selected according to New York State guidelines, i.e., they scored below the 23rd percentile on an English standardized measure; EP students were selected on basis of having above average reading scores and parental consent.

The curriculum paired two combined classes of 2nd and 3rd graders, English-proficient and limted-English proficient, who received instruction in Spanish as a second language and English as a second language, respectively. Unlike other two-way models, Port Chester mixed the two groups only for two classes each week in social studies and joint language activities. Initially, the plan was to increase the immersion component gradually and to achieve a balance of English and Spanish by the third year. Two biligual teachers taught the LEP and EP classes for three years. Crawford (1989) has described Port Chester's model as limited immersion in contrast to other two-way variations such astotal immersion that stress half the instruction in Spanish and half in English.

For each year of the program and for each group, results of multiple regression analysis will be reported, examining the effects of classroom environment on second language learning and language proficiency. Independent t-tests data between LEP and EP classroom perceptions will supplement these findings. Lastly, a pre/post test design using difference-score effect size data (ES) (Glass, McGaw & Smith, 1981; Light & Pillemer, 1984) will be used to ascertain the practical effects in first and second language achievement for each of the three years.

DATA SOURCES

Data were collected over a period of three years as required by the funding agency. The approach was amply described in a previous article which reported the first-year results of this program (Baecher & Coletti, 1986). Both data sets were collected between 1984-87. A pre-post evaluation design was required for all students in the program. Figure 1 summarizes the data collection instruments.

OBJECTIVE	INSTRUMENT	TARGET GROUP
Spanish Reading Skills	Comprehensive Test of Basic SKills (CTBS-Espanol: Voc. + Comp.)	EP & LEP
English/Spanish Oral Language Skills	Bilingual Inventory of Natural Language (BINL: English for LEP; Spanish for EP)	LEP & EP
English Reading Skills	Stanford Diagnostic Reading Test (SDRT)	LEP
English Reading Skills	Stanford Achievement Test (SAT: Reading Comp.)	EP
Mathematics Skills (Spanish)	Comprehensive Test of Basic Skills (CTBS-Espanol: Total Math)	LEP
Mathematics Skills (English)	Stanford Achievement Test (SAT: Total Math)	EP
Student Perceptions of Classroom Environment	My Class Inventory (MCI in Spanish and English)	EP & LEP

[a] LEP=Limited-English Proficient; EP=English-proficient

Figure 1. Standardized Instruments Employed To Measure Achievement Results and Student Perceptions of Port Chester's Two-Way Bilingual Program, 1984-87.

Except for the MCI, standardized tests yielded raw scores which were converted to normal curve equivalents (NCEs) for appropriate interval-level scaling. NCEs are the appropriate equivalent of percentiles and unlike percentiles, are preferred for statistical analysis because arithmetical operations can be performed only on equal-interval scales (Tallmadge, 1976). In addition, NCEs were used to calculate effect sizes to be described below.

The EP class included 15-17 students during the three year cycle. Since enrollments at any grade level were too low to form a single class, a combined 2-3 class was formed at the start of the project and was taught by the same teacher for the next three years. The teacher was responsible for teaching all subjects including reading, language arts, and a second language for both grades. All but two pupils were American-born and came from low to middle SES backgrounds. The LEP class consisted of 13-20 language-minority students who ranged from grades 2-5 during the project duration. All had less than three years of schooling in the U.S. at the start of the project with the majority with less than one year. They came from Guatemala, El Salvador, Columbia, Mexico, Ecuador, Peru, Cuba, and Uruguay. Needless to say, varying levels of bilingual proficiency (in Spanish and English), different cultural experiences, and

high rates of mobility characterized this LEP class. To highlight the mobility element, in the last year of the project, half the class was new to the program, with some students moving out of the district or entering the nearby Catholic school.

RESULTS

This section summarizes the results of the application of various descriptive and analytical techniques. Only major findings are reported to prevent this paper from becoming too lengthy.

Educational Achievement of LEP Students

Significant statistical and practical effects occurredin achievement for LEPs in English and Spanish for each year of the program.

How did LEP students benefit from use of their native language in reading and math, as well as in English? The following tables report the NCEs for each year of the project in chronological sequence.

Table 1 summarizes the findings of LEP instructional outcomes for 1984-85 (first year of the project). The information included in this table reports the results of the application of descriptive and analytical techniques.

Table 1.

Instructional Outcomes of LEP Pupils[a] of Port Chester's Two-Way Bilingual Project, 1984-85.

OBJECTIVE	INSTRUMENT	MEAN (NCEs)[b] PRE	POST	DIFFERENCE	STATISTICAL OUTCOME
Reading in Spanish (comprehension)	CTBS	19	37	+18	Significant beyond .05[c]
English oral proficiency	BINL	7	12	+5	Sig. beyond .05
Reading in English (comprehension)	SDRT	5	18	+13	Sig. beyond .05
Mathematics in Spanish (total math)	CTBS	39	47	+8	Not significant

[a] LEP pupils = 13

[b] NCEs are rounded to nearest 10th.

[c] Results of Wilcoxon-Matched Pairs Test (Conover, 1980)

These data manifest the initial and outstanding results of the first yearof the project. NCE gains are evident in all academic areas with English and Spanish reading showing the most gain among the areas that were tested.

Table 2 summarizes the findings of LEP instructional outcomes for 1985-86 (second year of the project).

Table 2.

Instructional Outcomes of LEP Pupils[a] of Port Chester's Two-Way Bilingual Project, 1985-86.

OBJECTIVE	INSTRUMENT	MEAN(NCEs)[b] PRE	POST	DIFFERENCE	STATISTICAL OUTCOME[c]
Reading in Spanish (vocabulary)	CTBS	59	66	+7	Significant beyond .01
Reading in Spanish (comprehension)	CTBS	51	60	+9	Sig. beyond .01
English oral proficiency	BINL	43	69	+26	Sig. beyond .01
Reading in English (comprehension)	SDRT	8	24	+16	Sig. beyond .01
Mathematics in Spanish (total math)	CTBS	51	66	+15	Sig. beyond .01

[a] LEP pupils = 17

[b] NCEs are rounded to nearest 10th

[c] Results of Wilcoxon-Matched Pairs Test (Conover, 1980)

Dramatic NCE gains are reported in Table 2: In every instructional areastatistical significance was reached. In the second year of the Two Way Bilingual project, all LEP students made remarkable academic growth in both English and Spanish. The growth in oral proficiency and reading skills in English was especially large.

Table 3 summarizes the findings of LEP instructional outcomes for 1986-87.

Table 3.

Instructional Outcomes of LEP Pupils[a] of Port Chester's Two-Way Bilingual Project, 1986-87.

OBJECTIVE	INSTRUMENT	MEAN (NCEs)[b] PRE	POST	DIFFERENCE	STATISTICAL OUTCOME
Reading in Spanish (vocabulary)	CTBS	55	57	+2	Not significant (NS)[c]
Reading in Spanish (comprehension)	CTBS	44	47	+3	NS
English oral proficiency	BINL	33	64	+31	Sig. beyond .01
Reading in English (comprehension)	SDRT	8	16	+8	Sig. beyond .01
Mathematics in Spanish (total math)	CTBS	43	49	+6	NS

[a] LEP pupils = 19

[b] NCEs are rounded to nearest 10th.

[c] Results of Wilcoxon-Matched Pairs Test (Conover, 1980)

These data demonstrate the effectiveness and viability of the bilingual approach: NCE gains were made in every academic area. Statistical significance was reached in both English oral proficiency and English reading--a real concern of those who doubt the transfer effects of using the child's native language in instruction. It should be pointed out that in the last year of the project, half the class was new to the program while the other half had been in the program for 2-3 years, thereby accourting for the non-significant findings in Spanish reading.

Since the LEP population did not remain the same for the entire length of the project, an important question needs to be answered. How did the gains achieved by students in each instructional area for 1986-87 compare with those of the same students for the previous two years? To answer this question, two separate analyses follow. One reports the effect sizes (ES) for the last three years for all LEP students who participated in the Two-Way Bilingual project. Another tracks the progress of those LEP students who remained in the program for three and two years respectively.

Effect size allows the practitioner to gauge the magnitude and direction of the impact of an educational treatment on individuals. As described by Glass et al. (1981), it is the difference between experimental and control posttest means divided by the control group's posttest standard deviation. However, this formula was adapted in the present study to take into account that no control group was available for comparison purposes. According to Light & Pillemer (1984), "effect sizes provide simple but useful estimates of how valuable a treatment really is" (pp.55-57), and under certain circumstances when certain

assumptions can be made, the pretest means can be used as a "proxy" for control group performance. Given the validity of the assumption that LEP pupils in bilingual programs cannot be easily compared to a formal control group (because of mandated testing for eligibility, prior school program experiences, entry and exit requirements), standard deviations for pretest scores were used in those instances where they were available.

Table 4 captures the magnitude and direction of the impact of the two-way program in terms of effect size from 1984 to 1987.

Table 4.

Effect Sizes (ES) for LEP Students in Port Chester's Two-Way Bilingual Project, 1984-1987.

ACADEMIC AREA	Effect Size[a] 1984-85	1985-86	1986-87
Reading in English (SDRT)	+1.09	+1.77	+.62
English Oral Language Proficiency (BINL)	+.55	+1.13	+.88
Reading in Spanish (CTBS)	+1.11	+.45	+.15
Spanish Vocabulary (CTBS)	Not tested	+.33	+.11
Math in Spanish (CTBS)	+.31	+.65	+.22

a Effect size provides useful information on programmatic impact and may be interpreted as follows: .20 = small ES; .50 = moderate ES; .80 = large ES. (Cohen,1977)

These data demonstrate both the magnitude and direction of the impact in selected academic areas of the Two-Way Bilingual program on LEP performance. The average effect size (ES) for reading in English was +1.16, well above the .80 level for a large effect size! This is undoubtedly an extraordinary accomplishment, providing substantive evidence of the effectiveness of the Two-Way Bilingual model as designed and implemented by Port Chester educators. The average ES for English oral proficiency was .85; for Spanish reading and vocabulary, they were .85 and .22, respectively, and the Math ES was .39.

These impressive effect size data are supplemented by a separate analysis of those particular students who remained in the project for three and two years respectively. This required tracking students who began the project in 1984 and 1985 through June 1987, forming two subgroups: 3-year and 2-year LEPs. Table 5 records their growth in NCEs for each year. Mean scores are used as part of the analysis. The reader is reminded that significant growth as indicated by tests of significance (Tables 1-3) and effect size (Table 4) was characteristic of all LEP pupils who participated in the project.

Table 5.

NCE Growth Rates of Three- and Two-Year LEP Pupils in Port Chester's Two-Way Bilingual Project, 1984-87.

	3-YEAR GROUP[b]			2-YEAR GROUP[c]	
ACADEMIC AREA	Yr.One (1984-5)	Yr.Two (1985-6)	Yr. Three (1986-7)	Yr.One (1985-6)	Yr.Two (1986-7)
English Reading	+9	+8	+9	0	+14
English Oral Proficiency	-2	+25	+12	+40	+17
Spanish Reading	+19	+11	-20	+6	+10
Spanish Vocab.	not avail.	+4	-8	+37	+2
Spanish Math	+19	+15	-15	+24	0

[a] Mean NCEs were used: In year one, Fall to Spring intervals; in year two, Fall to Spring; and in year three, Spring to Spring.

[b] n = 6 LEP

[c] n = 2 LEP

Consistent growth is evident from this analysis. With the exception of reading, vocabulary, and math in Spanish for the 3rd-year cohort in their last year of the project, growth in both "context-reduced" and "context-embedded" learning situations was maintained for these LEP students (Cummins,1981). One interpretation for the negative Spanish scores in year three might have been the teacher's emphasis on mastery of English literacy skills (these were all fifth graders who were entering a middle school without a bilingual program). It might be added that a similar trend has been observed by McConnell (1987) in her analysis of cohort data for various bilingual programs. She speculates that such a trend "appears to occur only in geographic areas where there is strong community pressure to make a transition from use of Spanish to English. As children rely increasingly on English there is an actual drop in Spanish vocabulary level." (p.6) In addition to these two subgroups, first year pupils in 1986-87 registered these NCE gains (Fall to Spring interval): English Reading: +6; English Oral Proficiency: +45; Spanish Reading: +13; Spanish Vocabulary: +12; and Spanish Math: +16 NCE.

One definite conclusion that emerges from these analyses of the longitudinal results of Port Chester's Two-Way Bilingual Program is the positive and cumulative academic effects of an integrated native language approach in the education of language-minority students. These data confirm the previous findings and rationales of authorities in bilingual and second-language education about the beneficial effects of using a native language approach in teaching LEP children (Collier,1987; Cummins, 1984; Hakuta & Gould, 1987).

Educational Achievement of EP Students

Mixed results were found for EP students in achievement in reading,

math, and second language learning for the three years.

How did EP students benefit from learning a second language as they continued to learn regular academic subjects? The following tables report the NCEs for each year of the project, beginning with the first year.

Table 6.

Instructional Outcomes of EP Pupils[a] of Port Chester's Two-Way Bilingual Project, 1984-85.

OBJECTIVE	INSTRUMENT	MEAN (NCEs)[b] PRE	POST	DIFFERENCE	STATISTICAL OUTCOME
Spanish oral proficiency	BINL	1	1	0	Not significant[c]
Reading in Spanish (vocabulary)	CTBS	1	37	+36	Sig. beyond .01
Reading in Spanish (comprehension)	CTBS	1	36	+35	Sig. beyond .01
Reading in English (comprehension)	SAT	75	68	-7	Not significant
Mathematics in English (total)	SAT	71	53	-18	Sig. beyond .01

[a] EP pupils = 17

[b] NCEs are rounded to nearest 10th

[c] Results of Wilcoxon-Matched Pairs Test (Conover, 1980)

Remarkable progress in learning Spanish as a second language (reading and vocabulary concepts) was recorded for the EP children in the first year of the project, reaching statistical significance. This combined 2-3 grade class was headed in the right direction in becoming functionally bilingual. However, NCE losses in math and English reading were unexpected: In the case of math, it was statistically significant. A combination of factors may have accounted for this. One overriding concern of the teacher during the first year of the project was the management of two separate curricula for both grade levels and teaching a second language.

Table 7 indicates the positive impact in second language learning and the negative trend in English reading and math that continued in the second year.

Table 7.

Instructional Outcomes of EP Pupils[a] of Port Chester's Two-Way Bilingual Project, 1985-86.

OBJECTIVE	INSTRUMENT	MEAN (NCEs)[b] PRE	POST	DIFFERENCE	STATISTICAL OUTCOME
Spanish oral proficiency	BINL	1	10	+9	Not significant[c]
Reading in Spanish (vocabulary)	CTBS	48	52	+4	Sig. beyond .01
Reading in Spanish (comprehension)	CTBS	42	34	-8	Sig. beyond .01
Reading in English (comprehension)	SAT	70	60	-10	Sig. beyond .01
Mathematics in English (total)	SAT	54	57	+3	Sig. beyond .01

[a] EP pupils = 15 [b] NCEs are rounded to nearest 10th

[c] Results of Wilcoxon-Matched Pairs Test (Conover, 1980)

These data indicate mixed results for EP pupils in the second year of the project. As a group they showed a 9 NCE gain in Spanish oral proficiency. Although loss in Spanish reading comprehension was evident, EP pupils continued to make headway in Spanish vocabulary. The math results were statistically significant: They gained 3 NCE points, overcoming the loss of the first year of the project. An NCE loss of 10 points in reading in English, however, caused concern for administrators, all that more important because of the loss noted in the first year. Classroom management concerns, problems in organizing differentiated reading groups for a combined 3-4 grade, and integrating second language instruction in the regular curriculum, continued to create difficulties for the teacher of the EP class.

Table 8 summarizes the findings of EP instructional outcomes in the last year of the project.

Table 8.

Instructional Outcomes of EP Pupils[a] of Port Chester's Two-Way Bilingual Project, 1986-87.

OBJECTIVE	INSTRUMENT	MEAN (NCEs)[b] PRE	POST	DIFFERENCE	STATISTICAL OUTCOME[c]
Spanish oral proficiency	BINL	5	39	+34	Sig. beyond .01
Reading in Spanish (vocabulary)	CTBS	48	89	+41	Sig. beyond .01
Reading in Spanish (comprehension)	CTBS	34	46	+12	Sig. beyond .05
Reading in English (comprehension)	SAT	61	57	-4	Not significant
Mathematics in English (total)	SAT	62	57	-5	Not significant

[a] EP pupils = 15-17

[b] NCEs are rounded to nearest 10th.

[c] Results of Wilcoxon-Matched Pairs Test (Conover, 1980)

These third year results for learning Spanish as a second language areoutstanding. Statistical significance was reached in Spanish oral proficiency, and Spanish vocabulary and reading. Although some NCE loss resulted in English reading and math, it was not statistically significant. One reason for the reading and math scores in English is due to the fact that the EP class had a new teacher between February and June of the last year of the project, the previous teacher having been removed from the project in the middle of the school year. The effect size data in Table 9 below demonstrate that the new teacher significantly reduced the magnitude of academic loss in reading and math which had been the trend for the first two and a half years of the project.

To answer the question about how the gains achieved by students in 1986-87 compared with those of the previous years, various analyses follow. One reports the effect sizes (ES) for the last three years for all EP students who participated in the Two-Way Bilingual project. Another approaches this question in terms of grade levels, since two separate class levels were taught by the same teacher for three years (except for the last four months when a new teacher was hired).

Table 9.

Effect Sizes for EP Students in Port Chester's Two-Way Bilingual Project, 1984-1987.

	Effect Size[a]		
ACADEMIC AREA	1984-85	1985-86	1986-87
Reading in English (SAT)	-.53	-.56	-.36
Math in English (SAT)	-1.28	+.16	-.35
Spanish Oral Language Proficiency (BINL)	0	+.39	+3.77
Reading in Spanish (CTBS)	+7.00	-.80	+.54
Spanish Vocabulary (CTBS)	+3.00	+.25	+1.68

[a] Effect size provides useful information on programmatic impact and may be interpreted as follows: .20 = small ES; .50 = moderate ES; .80 = large ES (Cohen, 1977).

These data portray the mixed results of the impact of the Two-Way Bilingual project on EP performance from 1984-1987. The average effect size (ES) for reading in English for the three years was -.48, slightly less than "moderate." It should be pointed out that by the end of the third year, the ES was reduced from a moderate effect size (-.56) to one that was slightly above "small" (-.36), a reduction of 64%. This was most likely due to the effective teaching of the new teacher who began in February 1987. The average ES in math was -.49, an area of continued concern. In the case of second language learning, their academic performance was outstanding: The average effect sizes for Spanish reading and vocabulary devel-opment were +2.24 and +1.64, respectively. The ES in Spanish oral language proficiency was +1.38. These data--well above the level for "large efffect size"--on second language learning performance demonstrate the extent to which Two-Way Bilingual Programs can enrich the academic curriculum of EP students. Nevertheless, attention to curricula design, teacher concerns, and academic progress are warranted in making this model effective for EP pupils.

Another analysis was made of the third year data (1986-87) to identify more precisely those grade levels within the EP group that made the most gain (or loss) in selected academic areas. Since the EP class was a combined 4th and 5th grade, the results of this analysis are that much more important. Table 10 includes a breakdown by grade level for selected academic areas, NCE status, and corresponding effect sizes.

Table 10.

NCE Scores and Effect Sizes for EP Students in Grades 4 and 5 in Port Chester's Two-Way Bilingual Project, 1986-1987.

	Grade 4[a]		Grade 5[b]	
ACADEMIC AREA	NCE	ES[c]	NCE	ES
Reading in English (SAT)	-5	-.55	-2	-.13
Math in English (SAT)	-8	-.66	+3	+.19

[a] n = 9 [b] n = 6 [c] ES=Effect Size

These data pinpoint the 4th graders as making the greater loss in bothreading and math NCEs while the 5th grade students made a small gain in math.

The results of these analyses are mixed. In one sense, they demonstrate that EP pupils can definitely benefit from a second-language learning curriculum. The effect size data point in this direction: Two-Way Bilingual Programs offer this opportunity for enrichment through second language learning. In another sense, however, this opportunity should not be at the expense of continued progress in native language reading and math. Since the teacher variable was so critical in the original design of Port Chester's model that involved a combined two grade class, future implementation efforts require careful monitoring of student outcomes in relation to teacher performance. Student learning, being cumulative, will reflect not only individual differences among students, but also the subtle interactions between teacher beliefs and expanded teaching repertoire required for any new type of practice.

Student Perceptions of Their Classroom Learning Environment

Significant differences on the MCI occurred between LEP and EP classes in friction, competitiveness, and cohesiveness at the end of the first year of the project. Significant differences in satisfaction and difficulty were identified at the end of the third year.

How did EP and LEP pupils perceive their classroom environment? Another important aim of Port Chester's Two-Way Bilingual Program was to determine student perceptions of their classroom environment. The My Class Inventory (MCI) (Fraser et al., 1982) was administered at the end of each year of the project in English and Spanish to both groups to ascertain students' level of satisfaction, friction, competitivenesss, difficulty, and cohesiveness within their classrooms. Representative items scored on a Yes or No basis include: "The pupils enjoy their schoolwork in my class;" "In our class the work is hard to do;""Many children in our class like to fight;" "In my class everybody is my friend;" and "Most children don't care who finishes first". Table 11

reports these findings for the last year of the project, since they were typical for the first two years of the project with the exceptions noted below.

Table 11.

Mean Scores of My Class Inventory (MCI) for EP and LEP Classes in Port Chester's Two-Way Bilingual Project, June 1987.

TWO-WAY BILINGUAL CLASS	MCI VARIABLE[a] SATISFACTION (27)	FRICTION (24)	COMPETITIVENESS (21)	DIFFICULTY (24)	COHESIVENESS (18)
EP[b]	24.7	13.2	14.0	10.5	15.4
LEP[c]	24.7	12.8	14.5	16.1	16.4

[a] Number in parenthesis for each MCI variable is maximum score value for that scale.

[b] EP = 13 [c] LEP = 17

Application of the Mann-Whitney U Testyielded a significant difference for the MCI variable, "difficulty" ($p = .001$). One interpretation of this outcome is that the LEP group with more than half the entire class being newcomers to the project in the third year of the project perceived their classroom to be that much more difficult in terms of assignments, expectations, and learning English as a second language than the EP group. Their teacher was mindful of the two distinct groups of pupils in the class: One half was entirley new and the other half had been in the program for one or two years. With regard to the other MCI variables--satisfaction, friction, competitiveness, and cohesiveness--no significant differences resulted. These data confirm the highly positive classroom environment in which both EP and LEP students perceived their learning of a second language and the continued development of their first language.

In the first year of the project, significant differences were noted in the areas of friction and cohesiveness between both groups, raising the possibility of cultural differences between groups. In the second year, the area of difficulty divided both groups, possibly due to the difficulties in learning two languages as well as subject areas. Overall, theseMCI data revealed high satisfication with the implementation of the Two-Way Bilingual Program during its three year duration.

Multiple Regression Analyses

Multiple regression analysis enables one to study the effects and the

magnitudes of the effects of more than one independent variable on one dependent variable (Kerlinger, 1973). This method captures the overall impact of a combined set of variables on another one, and is useful because it offers a fuller explanation of the dependent variable (Lewis-Beck, 1980). Squared multiple correlations were noted for each year: (significant Fs are reported.)

Year 1:

a. MCI data accounted for 30% of the variance in second language oral proficiency for both groups (n=33);

b. MCI data accounted for 11% of the variance in English reading proficiency for LEPs (n=10);

c. English reading proficiency and second oral language ability accounted for 61% of the variance in second language reading for EPs (n=18);

Year 2:

d. Spanish reading proficiency accounted for 82% of the variance in English language proficiency for LEPs (n=17);

e. MCI data accounted for 85% and 67% of the variance in second language oral and Spanish reading proficiency, respectively, among EP pupils (n=15);

f. Spanish reading ability and satisfaction accounted for 87% of the variance in English reading achievement for LEPs (n=17);

g. A combination of English reading ability, oral language proficiency, satisfaction, and difficulty accounted for 62% of the variance in Spanish reading ability for EPs (n=15);

Year 3:

h. MCI data accounted for 47% of the variance for number of years in the two-way program for both groups (n=29). (The variable of difficulty was significant.)

These data confirm the important role of classroom environment and language proficiency in bilingual and second language learning activities for elementary school children. For each year of the two-way project, students' perceptions of their classroom environment influenced their growth in learning a second language--English language development for LEPs and Spanish language for EPs.

Discussion

These findings based on longitudinal data yielded from norm-referenced tests and student questionnaires are very encouraging for second-language learning programs in general. Underlying these outcomes was the central belief held by teachers and administrators in the program that second-language learning can and ought to be an enriching experience. Language-learning-as-resource in contrast to language-learning-as-problem permeated the instructional practices of Port Chester's Two-Way Bilingual Program. LEP pupils made gains in reading, language arts, oral language proficiency, and math. No major setbacks

occurred in the cognitive growth of these children with the use of Spanish and English as the media of instruction. These three-year outcomes confirm Hakuta & Diaz's (1985) and Cummins' contention (1984) that bilingualism has positive benefits on the individual. These data, however, take this proposition one step further: bilingual instruction, offered in a setting that fosters additive bilingualism and takes into account the psychosocial learning environmentcan sustain positive impact on children from different cultural backgrounds.

In the case of language-majority pupils (EP), the two-way bilingual program made it possible for these students to learn a second language in a context supported not only by a teacher of Spanish but also by actual speakers of that language. In addition to one period of Spanish each day under the guidance of a Spanish teacher, twice a week students learned "side-by-side" with their LEP counterparts. Each student, in a way, served as a natural resource for one another. Whether in a cooperative learning group, or simply practicing vocabulary in English or Spanish, both groups began to perceive the benefits of bilingualism beyond their own immediate classroom situation. Although the evidence indicates some slippage in English language development--due to the complexity of implementing two separate curricula in one class and the teacher variable--nevertheless, EP students learned to understand, read, speak, and in some instances, to write a second language.

Conclusion

These longitudinal results of Port Chester's Two-Way Bilingual Program can contribute to a better understanding of the complex relationships between student perceptions of their classroom environment, language proficiency, and second language learning. In particular, researchers and practitioners can benefit from these findings in identifying those links and instructional processes that can improve the education of language-minority students and at the same time, enrich the regular curriculum for language-majority pupils through learning a second language.

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